(Medicinal Products.)

THE

AGRICULTURAL LEDGER.

1897—No. 19.

ACONITUM FEROX, A. FEROX, *var.* CRASSICAULIS, AND A. NAPELLUS.

(THE ROOTS.)

[*DICTIONARY OF ECONOMIC PRODUCTS, Vol. I., A. 397-413.*]

THE CONSTITUENTS OF SOME INDIAN ACONITES.

A Report by PROFESSOR WYNDHAM R. DUNSTAN, *Director of the Scientific Department of the Imperial Institute, London.*

Other DICTIONARY articles that may be consulted:

Aconitum heterophyllum, *Vol. I.*, A. 401.
A. palmatum, *Vol. I.*, A. 413.

also

The Agricultural Ledger No. 32 of 1896.

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(Medical and Chemical Series, No. 11.)
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THE CONSTITUENTS OF SOME INDIAN ACONITES.

A Report by PROFESSOR WYNDHAM R, DUNSTAN, *Director of the Scientific Department of the Imperial Institute, London.*

Introductory Note.

The specimens of Aconite root which furnished the subject of this paper, were collected in the autumn of 1895 in response to a circular letter drawn up by the Reporter on Economic Products and sent to the Conservators of Forests of Bengal, Panjab and North-West Provinces. Professor Dunstan's work in the chemistry of the aconites having attracted considerable attention, Sir F. Abel applied to the Government of India for additional supplies of the roots to enable the investigation to be continued. The interesting series of experiments commenced in the Research Department of the Pharmaceutical Society of Great Britain and were resumed in the laboratories of the Imperial Institute on the reorganisation of the Scientific Department. Several papers on the subject have appeared in the *Journal of the Chemical Society*. The main features of the research have been the examination of the roots of **Aconitum Napellus** and an enquiry into the constitution of its alkaloid, aconitine. An important publication by Dr. Jowett has appeared concerning the root of **A. heterophyllum** and its active principle, atisine. Preliminary notices have

Aconite Research.

A. heterophyllum. See Agricultural Ledger No. 32 of 1896.

ACONITUM ferox. — **The Constituents of**

also appeared (*Journ. Chem. Soc.*, March, 1887,) with regard to **A. ferox,** and its alkaloid, pseudaconitine, and an accurate method has been devised for the estimation of the alkaloid in the root.

Aconitum ferox.

A. ferox, *Wall.*, grows in Himálayan localities from Sikkim to Garhwál at elevations of between 10,000 and 15,000 feet. The roots sent to the Imperial Institute were kindly collected by **Mr. F. B. Manson,** Deputy Conservator of Forests, Darjiling Division. The first consignment was advised on the 21st December, 1895, and consisted of roots of **A. ferox** (*Bikh*) (Reg. No. 6812) and roots of *Kalo Bikhoma* (Reg. No. 6813) identified as a variety of **A. ferox,** *viz.*, **crassicaulis** (—A form described in *Monograph on Certain Rare Plants of the Ranunculaceæ, by P. Brühl, Annals of Royal Botanic Garden, Calcutta, Vol. V., p. 110*). In January, 1896, the remaining quantities of the same collection were sent to this office by the Deputy Conservator and as these were accompanied with botanical specimens they had assigned to them separate registration numbers. They consisted of the roots *Bikh* (Reg. No. 7037) and *Kalo Bikhoma* (Reg. No. 7038). But the discrepancy pointed out by **Professor Dunstan** in the chemical composition of two sets of roots, supposed to have been identical, led to a fresh enquiry. In consequence it has been found that a mistake had been made by the contributor in subsequently assigning the numbers one, two and three in a different sequence to that given in the first consignment. In consequence No. 6812 was found by **Professor Dunstan** to differ materially from, instead of being identical with, 7037. Further Nos. 7037 and 7038 were found to be identical instead of independent forms. But now comes the most curious part of the enquiry. **Professor Dunstan's** investigations identify the variety **A. ferox** *var.* **crassicaulis,** Nos. 7037 and 7038, as the drug hitherto recognised, and the typical form of the species **A. ferox** (No. 6812) as containing a crystalline compound not hitherto known.

A. ferox var. crassicaulis.

It is thus satisfactory to learn that, so far as the enquiry has progressed, the botanical isolation of the variety **crassicaulis** is confirmed by the chemical results obtained.

Since receipt of **Sir F. Abel's** letter below, the botanical specimens corresponding to the above roots have very kindly been examined by **Drs. King** and **Prain** and the identifications critically confirmed. But in order to allow of a more complete enquiry steps

have been taken to obtain further supplies of the two Darjiling forms **A. ferox** and **A. ferox** *variety* **crassicaulis.**

From Sir F. A. Abel, Bart., K.C.B., *Honorary Secretary and General Director, Imperial Institute, London, to* George Watt, Esq., M.B., C.M., C.I.E., *Reporter on Economic Products to the Government of India, Indian Museum, Calcutta,—No. 120 F. S. S., dated London, 30th October, 1897.*

I have the honour to forward, herewith, a second Report by Professor Dunstan, the Director of the Scientific and Technical Department of the Imperial Institute, on certain results furnished by investigation of the constituents of some Indian Aconites; and I would direct attention to the suggestion that a further supply of the roots of Nepaul Aconite (**Aconitum ferox**) is desirable, with a view to the fuller examination of the crystalline alkaloid which has been extracted from one specimen. Further samples of the roots of **Aconitum Napellus** might, as Professor Dunstan points out, be furnished with advantage.

Report by the Director of the Scientific Department on the Constituents of some Indian Aconites.

In continuation of previous investigations, already reported (Report on **Aconitum heterophyllum,** dated 25th July, 1896; Second Quarterly Report to the Indian Committee, dated 7th January, 1897; Annual Report to the Indian Committee on Investigations conducted for the Government of India, for the year ending 1st April, 1897; letter No. 116 F. S. S., dated July 22nd, 1897) of the constituents of the various Aconites occurring in India, a qualitative and quantitative examination has been made of the alkaloids contained in specially collected samples of the roots of Nepaul Aconite (**Aconitum ferox**) and of **Aconitum Napellus,** which have been received from the Reporter on Economic Products to the Government of India (letter No. 1369—116 F. S. S., from Reporter on Economic Products, dated May 13th, 1896).

Previous Investigations.

Nepaul Aconite (**Aconitum ferox**).—Five samples of roots have been examined, one from the Panjab, the other four from Bengal. With the exception of one of the latter specimens (No. 6812), all these roots furnished a crystalline alkaloid which corresponded in every respect with the highly poisonous

A. ferox and pseudaconitine.

ACONITUM ferox. **The Constituents of**

'pseudaconitine' of which an account has been already published by Mr. F. H. Carr and myself (*Journal of the Chemical Society, 1897*). A further description of the properties and physiological action of this alkaloid will shortly be communicated.

A peculiar alkaloid.

A crystalline alkaloid was extracted from one specimen of roots (No. 6812), certain properties of which do not exactly correspond with those of pseudaconitine. If a further supply of these roots can be procured, I should like to examine this alkaloid more fully.

Estimation of alkaloid.

The quantity of pseudaconitine contained in each sample has been estimated by a process which consisted in the extraction of the alkaloid and the separation from it by hydrolysis of the veratric acid; by these means the following results were obtained:—

Indian Invoice Number.	Imperial Institute Number.	Name.	District.	Percentage of Alkaloid.
6806	7149	A. ferox . . .	Bashahr through the Conservator of Forests, Panjab.	·40
6813	7151	A. ferox, *var.* crassicaulis.	Through the Deputy Conservator of Forests, Darjiling, Bengal.	·41
7037	7153	A. ferox . . .	Ditto ditto .	·39
7038	7154	A. ferox, *var.* crassicauils.	Ditto ditto .	·50
6812	7150	A. ferox . . .	Ditto ditto .	·35

Large proportion of pseudaconitine.

These results are interesting in revealing a larger percentage of pseudaconitine than has hitherto been supposed to occur in the roots of this plant, in one case as much as half per cent. being present. These roots, therefore, contain a larger proportion of pseudaconitine than the roots of the closely allied **Aconitum Napellus** contain of aconitine.

The investigations which are being conducted by the Scientific Department render it probable that Nepaul Aconite and its active alkaloid, pseudaconitine, will prove to be as valuable medicinally as the **Aconitum Napellus** and its active alkaloid, aconitine, which are now almost exclusively employed in Europe. At present there is no large demand for Nepaul Aconite in the English market, chiefly because of the uncertainty which has hitherto surrounded the nature of its constituents and their precise medical action; even the exact source of Nepaul Aconite is not yet settled; although the plant is usually regarded as **Aconitum ferox**, there is some

Source of Nepaul Aconite not defined.

reason for doubting whether this is the case. I hope that the attention of the Botanical Survey of India will be directed to this question.

A. Napellus a poor sample.

Aconitum Napellus.—The one sample (6803) of the roots of this plant came from Kaghan, Panjab. On examination the roots were found to contain the same constituent, aconitine, as the plant furnishes when grown in Europe. The proportion of this alkaloid in the present specimen is very small, and the sample compares unfavourably with the roots of European origin which appear in the English market.

I shall be glad to receive for examination specimens of the roots of these two plants from other districts of India, and also of the roots of any other species or varieties of aconite than those with which we have already been supplied.

A further report will shortly be made on the examination of the later series of aconite specimens received in June, 1897, including a preliminary account of the constituents of **Aconitum palmatum.**

G. I C. P. O.—No. 650 R. & A.—31-1-98—2,200.

All communications regarding THE AGRICULTURAL LEDGER should be addressed to the Editor, Dr. George Watt, Reporter on Economic Products to the Government of India, Calcutta.

The objects of this publication (as already stated) are to gradually develop and perfect our knowledge of Indian Agricultural and Economic questions. Contributions or corrections and additions will therefore be most welcome.

In order to preserve a necessary relation to the various Departments of Government, contributions will be classified and numbered under certain series. Thus, for example, papers on Veterinary subjects will be registered under the Veterinary Series; those on Forestry in the Forest Series. Papers of more direct Agricultural or Industrial interest will be grouped according as the products dealt with belong to the Vegetable or Animal Kingdom. In a like manner, contributions on Mineral and Metallic subjects will be registered under the Mineral Series.

This sheet and the title-page may be removed when the subject-matter is filed in its proper place, according to the letter and number shown at the bottom of each page.